SOME PRICE RELATIONSHIPS OF

# Hawaiian Canned Pineapple and Selected Pacific Coast Canned Fruits

1947–1961 • J. A. MOLLETT

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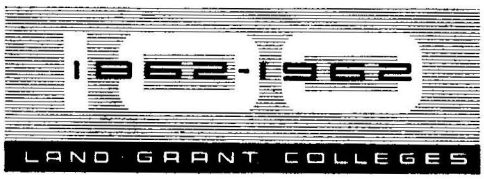


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CREATING THE LAND-GRANT COLLEGE SYSTEM

# SOME PRICE RELATIONSHIPS OF HAWAIIAN CANNED PINEAPPLE AND SELECTED PACIFIC COAST CANNED FRUITS, 1947-1961

J. A. Mollett[1/]

## INTRODUCTION

Relatively few data are available about price experience of Hawaiian canned pineapple in the domestic market. In contrast, a long-established series of statistical-economic analyses (prepared by Hoos and Kuznets of the Giannini Foundation of Agricultural Economics, University of California, Berkeley) is available which shows relationships of prices of canned cling peaches, pears, freestone peaches, and apricots to major market influences. The following analysis (based on procedures developed by Hoos and Kuznets) remedies part of this lack in our knowledge of recent pineapple price experience. It covers the 14-year period from 1947-48 through 1960-61.

## THE ANALYSIS OF PRICE RELATIONSHIPS

The major factors influencing prices of canned fruits in the United States market are the domestic commercial movement from canneries, the level of national disposable personal income, and the relative level of prices of canned fruits competing with the respective canned fruit(s).

Table 1 summarizes the relevant data for canned pineapple. This table shows f.o.b. (San Francisco) prices of canned pineapple and related economic variables during the period from 1947-58 to 1960-61.

Certain trends are clearly shown. They include the following: (1) the f.o.b. (San Francisco) price of canned pineapple rose steadily from $6.10 per case in 1947-48 to $8.05 per case in 1960-61; (2) the adjusted index of competing fruit prices (weighted average price of competing canned fruits divided by index of U. S. disposable national income) fell by half during this 14-year period, from 111.8 to 52.5 (1947-48 to 1949-50 = 100), reflecting the lower real cost of canned fruit; (3) domestic movement of canned pineapple increased somewhat unevenly from 10.1 million cases in 1947-48 to 13.1 million cases in 1960-61; this upward shift tended to slow down after 1957-58; (4) national disposable personal income doubled in the 14-year period under review.

A multiple-linear regression equation based on the four variables given in table 1 was calculated.[2/] Price is the dependent variable in this equation, fitted by the method of least squares.

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2/ The calculations were made on an IBM 650 with a program which shifted decimal points to the following positions, using 1947-48 canned pineapple data as an example: $X_1$ = 6,100; $X_2$ = 10,112; $X_3$ = 94,800; $X_4$ = 111,800.

Table 1. F.O.B. prices (San Francisco) of canned Hawaiian pineapple and related economic variables from 1947-48 through 1960-61

| Marketing year, June through May | 1<br>F.O.B. price (San Francisco) of Hawaiian canned pineapple (sliced, fancy, No. 2½) | 2<br>F.O.B. commercial domestic movement of canned pineapple* (24 No. 2½ basis) | 3<br>Index of United States disposable personal income | 4<br>Adjusted index of competing canned fruit prices |
|---|---|---|---|---|
| | Dollars per case | Millions of cases | 1947-48 to 1949-50 = 100 | 1947-48 to 1949-50 = 100 |
| 1947-48 | 6.10 | 10,112 | 94.8 | 111.8 |
| 1948-49 | 6.80 | 11,684 | 101.9 | 102.4 |
| 1949-50 | 6.40 | 11,920 | 103.3 | 83.5 |
| 1950-51 | 6.80 | 13,032 | 115.7 | 94.6 |
| 1951-52 | 6.80 | 9,685 | 123.2 | 91.6 |
| 1952-53 | 6.85 | 11,695 | 131.0 | 81.2 |
| 1953-54 | 6.85 | 12,050 | 134.6 | 78.2 |
| 1954-55 | 6.90 | 12,743 | 139.5 | 76.7 |
| 1955-56 | 7.35 | 13,198 | 150.4 | 72.6 |
| 1956-57 | 7.40 | 12,101 | 159.8 | 66.6 |
| 1957-58 | 7.45 | 12,457 | 165.4 | 61.7 |
| 1958-59 | 7.75 | 12,779 | 174.0 | 63.7 |
| 1959-60 | 8.05 | 12,951 | 182.9 | 54.6 |
| 1960-61** | 8.05 | 13,100 | 189.3 | 52.5 |

* Hawaii canned pineapple averaged about 83 percent of total movement.
**Preliminary; subject to revision.

Sources: Sidney Hoos and George M. Kuznets, Pacific Coast Canned Fruits F.O.B. Price Relationships, 1960-61, California Agricultural Experiment Station, Giannini Foundation Research Report No. 246, July 1961.
Column 4: Calculated from data given in above report.

This equation emerged as follows:

$$(\log_e X_1)' = 4.2068 + .0907(\log_e X_2) + .3227(\log_e X_3) - .0009(\log_e X_4)$$

$$R = 0.96$$

$X_1$ is the annual average f.o.b. (San Francisco) price (sliced, fancy, No. 2½) of Hawaiian canned pineapple (dollars per case).

$X_2$ is the canners' commercial domestic movement of canned pineapple (in units of 1 million cases).

$X_3$ is the index of United States disposable personal income (1947-48 to 1949-50 = 100).

$X_4$ is the adjusted index of prices of competing canned fruits.

R is the coefficient of multiple correlation.

Table 2 compares two sets of f.o.b. (San Francisco) prices of Hawaiian canned pineapple. The first set is the actual f.o.b. prices and the second set is the estimated prices derived from the regression equation already described. A very close relationship is shown to exist between actual and estimated prices. This situation indicates the effectiveness of the chosen regression equation in expressing correctly the impact of major economic forces on canned pineapple prices.

This regression equation clearly has some predictive qualities. It may be interpreted in the following way:

A change of 10 percent in the commercial movement (24 No. 2½ basis) of canned pineapple, considered by itself, was on the average accompanied by a change in the same direction of about 1 percent in the f.o.b. (San Francisco) price.

An increase of 10 percent in the index of disposable income, considered by itself, was on the average accompanied by an increase of about 3 percent in the f.o.b. (San Francisco) price.

A change of 10 percent in the adjusted index of prices of competing canned fruits, considered by itself, was on the average accompanied by no change in the f.o.b. (San Francisco) price of Hawaiian canned pineapple.

These three price relationships of canned pineapple are perhaps understood more clearly if they are contrasted with the corresponding relationships of selected Pacific Coast competing canned fruits.

Table 3 summarizes these different relationships for canned pineapple, freestone peaches, cling peaches, pears, fruit cocktail, and apricots. The regression equations on which this table is based are shown in the Appendix.

Column 1 in table 3 shows that a 10 percent change in the commercial domestic movement from canneries, considered by itself, exerted greatest influence on price in the opposite direction for freestone peaches, pears, and apricots. The effect of such a change on canned pineapple, cling peaches, and fruit cocktail, considered by itself, is shown to be very limited.

Table 2. Actual and estimated f.o.b. prices (San Francisco) of Hawaiian canned pineapple, sliced, fancy, No. 2½, 1947-48 through 1960-61

| Marketing year, June through May | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | Actual f.o.b. price | Estimated f.o.b. price | Difference (col. 1 - col. 2) | Percentage difference (col. 3 as % of col. 1) |
| | Dollars per case | Dollars per case | Dollars per case | Percent |
| 1947-48 | 6.10 | 6.01 | +0.09 | +1.5 |
| 1948-49 | 6.80 | 7.20 | -.40 | -5.9 |
| 1949-50 | 6.40 | 6.34 | +.06 | +.9 |
| 1950-51 | 6.80 | 6.84 | -.04 | -.6 |
| 1951-52 | 6.80 | 6.89 | -.09 | -1.3 |
| 1952-53 | 6.85 | 6.74 | +.11 | +1.6 |
| 1953-54 | 6.85 | 6.66 | +.19 | +2.8 |
| 1954-55 | 6.90 | 6.65 | +.25 | +3.6 |
| 1955-56 | 7.35 | 7.34 | +.01 | +.1 |
| 1956-57 | 7.40 | 7.36 | +.04 | +.5 |
| 1957-58 | 7.45 | 7.35 | +.10 | +1.3 |
| 1958-59 | 7.75 | 7.81 | -.06 | -.8 |
| 1959-60 | 8.05 | 8.27 | -.22 | -2.7 |
| 1960-61* | 8.05 | 8.18 | -.13 | -1.6 |

*Preliminary; subject to revision.

Sources: Column 1 - table 1, column 1.
Column 2 - estimated by use of data in table 1 applied to equation described.

Probably of more significance are the data summarized in column 2 of table 3. They show that a 10 percent change in the level of national disposable personal income, considered by itself, was on the average accompanied by a change in the same direction of only 3 percent for canned pineapple but as much as 15 percent for freestone peaches, cling peaches, and pears. Relevant figures were 7 percent for apricots and 5 percent for fruit cocktail. These data show that the postwar rise in national disposable income has exerted less impact on prices of pineapple (and incomes of pineapple growers) than on prices of other major canned fruits.

Table 3. F.O.B. (San Francisco) price relationships of selected canned fruits, 1947-48 through 1960-61

Percent change in price of respective canned fruit(s) caused by a 10 percent change in each of the three factors, considered by itself, (+ = change in same direction)

| Canned fruits | Commercial domestic movement from canneries | Index of national disposable income | Adjusted index of prices of competing canned fruits |
|---|---|---|---|
| | Percent | Percent | Percent |
| Pineapple | +1 | +3 | none |
| Freestone peaches | -4 | +15 | +11 |
| Cling peaches | -1 | +15 | +14 |
| Pears | -5 | +15 | +14 |
| Fruit cocktail | +1 | +5 | +6 |
| Apricots | -3 | +7 | +7 |

Sources: Pineapple data based on regression equation given in text. Data for other canned fruits based on regression equations given in the Appendix.

The third relationship in table 3 (in column 3) shows clearly that canned pineapple is out of step in the general price movements of canned fruits. A 10 percent change in the adjusted index of prices of competing canned fruits, considered by itself, was on the average accompanied by a price change in the same direction of 14 percent for cling peaches and pears, of 11 percent for freestone peaches, for example, but by no price change for canned pineapple. This situation undoubtedly reflects the bargaining strength of the small number of firms which control Hawaii's pineapple industry. The inventory holding strength of these large firms is considerable and it is clearly in the interest of and within the ability of each firm not to "upset the market." Although a formal marketing agreement among these few firms is illegal, common interest among them in maintaining the price of a product (canned pineapple) with a low price elasticity of demand suggests that such an unwritten and unspoken understanding exists.

Hawaii's large pineapple packers thus operate in the traditional pattern of oligopolists. The essential feature of oligopoly is that the small number of sellers makes it imperative for each to weigh carefully the reactions of the others to his own price and production policies. Prices under such circumstances tend to resemble administered prices.

The preceding analysis shows clearly that the price experience of Hawaiian canned pineapple differs significantly from the price experience of Pacific Coast competing canned fruits. From the Islands' pineapple industry viewpoint the most depressing feature of this analysis is the relatively small effect on price of the sharp rise in the level of national disposable income. The most favorable feature is that canned pineapple shipments have steadily risen (per capita consumption has remained unchanged) in spite of the relatively high prices (f.o.b. San Francisco) of canned pineapple.

## APPENDIX

In the following regression equations, prepared on a similar basis to the equation for pineapple prices:

$X_1$ is the annual average f.o.b. price (choice, No. 2½) of the respective canned fruit (dollars per case).

$X_2$ is the canners' commercial domestic movement of the respective (California) fruit.

$X_3$ is the index of United States disposable personal income (1947-48 to 1949-50 = 100).

$X_4$ is the adjusted index of prices of competing canned fruits (1947-48 to 1949-50 = 100).

R is the coefficient of multiple correlation.

These equations relate to the 14-year period from 1947-48 through 1960-61.

Freestone Peaches

$$(\log_e X_1)' = -17.8316 - .4393(\log_e X_2) + 1.4724(\log_e X_3) + 1.1340(\log_e X_4)$$

$R = 0.94$

Cling Peaches

$$(\log_e X_1)' = -23.4234 - .1125(\log_e X_2) + 1.4572(\log_e X_3) + 1.4062(\log_e X_4)$$

$R = 0.84$

Pears

$$(\log_e X_1)' = -21.8348 - .4507(\log_e X_2) + 1.5307(\log_e X_3) + 1.4227(\log_e X_4)$$

$R = 0.96$

Fruit Cocktail

$$(\log_e X_1)' = -5.3390 + .1172(\log_e X_2) + .5078(\log_e X_3) + .6264(\log_e X_4)$$

$R = 0.87$

Apricots

$$(\log_e X_1)' = -5.3061 - .3181(\log_e X_2) + .7358(\log_e X_3) + .6939(\log_e X_4)$$

$R = 0.94$

Table A-1. F.O.B. prices* of selected canned fruits, 1947-48 through 1960-61

| Marketing year, June through May | 1 California cling peaches (choice, No. 2½) | 2 California apricots (choice, No. 2½) | 3 Pacific Coast pears (choice, No. 2½) | 4 Pacific Coast freestone peaches (fancy, No. 2½) | 5 California fruit cocktail (choice, No. 2½) | 6 Hawaiian pineapple (sliced, fancy, No. 2½) f.o.b. San Francisco |
|---|---|---|---|---|---|---|
| | Dollars per case | Dollars per case | Dollars per case | Dollars per case | Dollars per case | Dollars per case |
| 1947-48 | 4.78 | 6.00 | 7.10 | 6.50 | 6.90 | 6.10 |
| 1948-49 | 5.10 | 5.25 | 8.10 | 7.00 | 6.65 | 6.80 |
| 1949-50 | 4.07 | 5.00 | 5.30 | 5.90 | 5.70 | 6.40 |
| 1950-51 | 5.17 | 5.75 | 7.80 | 7.50 | 6.65 | 6.80 |
| 1951-52 | 5.53 | 5.94 | 7.86 | 7.50 | 6.68 | 6.80 |
| 1952-53 | 5.32 | 5.68 | 6.49 | 7.00 | 6.41 | 6.85 |
| 1953-54 | 5.12 | 5.25 | 6.91 | 6.70 | 6.67 | 6.85 |
| 1954-55 | 5.17 | 5.66 | 6.92 | 6.45 | 6.57 | 6.90 |
| 1955-56 | 5.70 | 5.10 | 6.72 | 6.78 | 6.56 | 7.35 |
| 1956-57 | 5.35 | 5.60 | 6.89 | 6.29 | 6.22 | 7.40 |
| 1957-58 | 5.10 | 5.48 | 6.25 | 6.10 | 6.28 | 7.45 |
| 1958-59 | 5.36 | 6.75 | 6.88 | 6.16 | 6.83 | 7.75 |
| 1959-60 | 4.89 | 5.38 | 6.15 | 5.79 | 6.27 | 8.05 |
| 1960-61 | 4.86 | 5.24 | 6.50 | 5.52 | 6.17 | 8.05 |

*Based on weighted average canners' f.o.b. sales prices (for cling peaches, apricots, pears, freestone peaches, and fruit cocktail) determined from canners' reports on their billings and invoices of sales f.o.b. cannery or dock (including brokerage, cash discount, and swell, label, and case allowances but excluding any special or trade discounts and any prepaid charges included in delivery prices such as freight and marine insurance). Prices adjusted to an industrywide common or nondifferentiated basis by modification for recognized price premiums conventional for certain brands.

Source: Hoos, Sidney and George M. Kuznets, Pacific Coast Canned Fruits F.O.B. Price Relationships, 1960-61, California Agricultural Experiment Station, Giannini Foundation Research Report No. 246, July 1961, p. 7.

Table A-2. Canners' commercial domestic movement of selected canned fruits, 1947-48 through 1960-61

| Marketing year, June through May | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | California cling peaches (24 No. 2½ basis) | California apricots (24 No. 2½ basis) | Pacific Coast pears (24 No. 2½ basis) | Pacific Coast freestone peaches (24 No. 2½ basis) | California fruit cocktail (24 No. 2½ basis) | Pineapple (24 No. 2½ basis) |
| | Thousands of cases | Thousands of cases | Thousands of cases | Thousands of cases | Thousands of cases | Thousands of cases |
| 1947-48 | 13,843 | 2,415 | 4,866 | 2,155 | 8,836 | 10,112 |
| 1948-49 | 12,382 | 3,528 | 3,660 | 2,322 | 6,791 | 11,684 |
| 1949-50 | 15,615 | 3,072 | 5,613 | 2,178 | 6,977 | 11,920 |
| 1950-51 | 14,287 | 3,565 | 4,815 | 2,135 | 7,364 | 13,032 |
| 1951-52 | 13,648 | 3,410 | 4,348 | 2,507 | 5,604 | 9,685 |
| 1952-53 | 14,351 | 3,148 | 5,700 | 3,075 | 7,452 | 11,695 |
| 1953-54 | 14,706 | 3,934 | 5,401 | 3,156 | 6,945 | 12,050 |
| 1954-55 | 14,086 | 3,177 | 6,272 | 3,841 | 8,037 | 12,743 |
| 1955-56 | 15,023 | 4,494 | 6,763 | 3,859 | 8,145 | 13,198 |
| 1956-57 | 15,008 | 3,852 | 6,789 | 4,688 | 8,844 | 12,101 |
| 1957-58 | 16,925 | 3,871 | 7,746 | 4,753 | 8,683 | 12,457 |
| 1958-59 | 13,886 | 2,052 | 7,077 | 5,161 | 8,866 | 12,779 |
| 1959-60 | 17,384 | 4,026 | 8,009 | 5,449 | 10,275 | 12,951 |
| 1960-61* | 15,984 | 4,069 | 6,998 | 5,755 | 9,693 | 13,100 |

*preliminary; subject to revision.

Source: Hoos and Kuznets, Pacific Coast Canned Fruits F.O.B. Price Relationships, 1960-61, p. 8.

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